No. 7800105

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

South Dakota Agricultural Experiment Station
South Dakota State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF seventeen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS PRESCRIBED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Eureka'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington *this* 25th *day of* January *in the year of our Lord one thousand nine hundred and* seventy-nine

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

FORM APPROVED
OMB NO. 40-R3822

No certificate for plant variety protection may be issued unless a completed application form has been received (5 U.S.C. 553).

1a. TEMPORARY DESIGNATION OF VARIETY	1b. VARIETY NAME	FOR OFFICIAL USE ONLY
SD 2185	Eureka CI 17738	PV NUMBER 7800105
2. KIND NAME Wheat, Hard Red Spring	3. GENUS AND SPECIES NAME Triticum aestivum L.	FILING DATE 8-30-78
4. FAMILY NAME (BOTANICAL) Gramineae	5. DATE OF DETERMINATION Date of increase decision 3/11/77 Date of release 1/ 1/78	FEE RECEIVED $ 500.00 $ 250.00
		TIME 9:00 (A.M.) P.M.
		DATE 8-30-78 12-18-78

6. NAME OF APPLICANT(S)	7. ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*	8. TELEPHONE AREA CODE AND NUMBER
South Dakota Agricultural Experiment Station South Dakota State Univ.	Brookings, SD 57007	(605)688-5121

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: *(Corporation, partnership, association, etc.)*	10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION	11. DATE OF INCORPORATION
Agricultural Experiment Station		

12. NAME AND MAILING ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS:

Dr. Ray A. Moore, Director
South Dakota Agric. Exp. Station
SDSU, Brookings, SD 57007

Dr. Don L. Keim, Spring Wheat Breeder
Department of Plant Science
SDSU, Brookings, SD 57007

13. **CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:**

- [x] 13A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
- [x] 13B. Exhibit B, Novelty Statement.
- [x] 13C. Exhibit C, Objective Description of the Variety *(Request form from Plant Variety Protection Office.)*
- [x] 13D. Exhibit D, Additional Description of the Variety.

14a. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a). (If "Yes," answer 14B and 14C below.)* [x] YES [ ] NO

14b. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?	14c. IF "YES," TO 14B, HOW MANY GENERATIONS OF PRODUCTION BEYOND BREEDER SEED?
[x] YES [ ] NO	B 4/24/78 [1] FOUNDATION [1] REGISTERED [1] CERTIFIED

15a. DID THE APPLICANT(S) FILE FOR PROTECTION OF THIS VARIETY IN OTHER COUNTRIES? [ ] YES [x] NO *(If "Yes," give name of countries and dates.)*

15b. HAVE RIGHTS BEEN GRANTED THIS VARIETY IN OTHER COUNTRIES? [ ] YES [x] NO *(If "Yes," give name of countries and dates.)*

16. DOES THE APPLICANT(S) AGREE TO THE PUBLICATION OF HIS/HER (THEIR) NAME(S) AND ADDRESS IN THE OFFICIAL JOURNAL? [x] YES [ ] NO

17. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

7-18-78
(DATE)

Ray A. Moore
(SIGNATURE OF APPLICANT)

7/14/78

Don L. Keim

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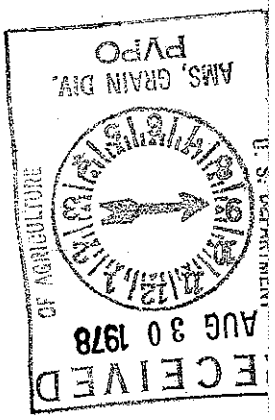
INSTRUCTIONS

GENERAL: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and $500 fee ($250 filing fee and $250 examination fee) to U.S. Dept. of Agriculture, Agricultural Marketing Service, Livestock, Poultry, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.



ITEM

5 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.

13a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.

13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

13c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.

13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as, plant habit, plant color, disease resistance, etc.

14a If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "NO," he may change his choice. (See section 180.16 of the Regulations and Rules of Practice.)

15a See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

13A. Origin and Breeding History of the Variety

1. Eureka is an F_5-derived head selection from the cross, ERA/3/CORRE CAMINO//CIANO 67/SONORA 64, CM10656 (Table 1). This cross was made by the International Maize and Wheat Improvement Center (CIMMYT) in Mexico.

2. Breeders seed was increased at Yuma, Arizona, in 1975 and again at Moody County in 1976.

3. Short, awned plants described as off types were rogued in the 1975 and 1976 increases. The frequency of off types, in the present Breeder's seed stock is less than 0.1%.

4. Other than the variants described in (3) above, the variety has been uniform for all plant characters in the increase fields. The variants are a result of either a low percentage of natural outcrossing or genetic mutation. Similar variants were found in certified seed sources of other awnletted varieties, such as Waldron, Chris and Ellar, in 1977.

13B. Novelty Statement

Eureka is a cultivar of Triticum aestivum L. with spring growth habit. The kernels are free-threshing, red, hard, mid-long and ovate. Kernel size is about 6 mm long and about 3 mm wide. The germ is small. The cheeks are angular with a midwide and middeep crease. The brush is midsized and midlong. There is no collar.

The spike is awnletted, fusiform, and erect. Spike length is typically 7 cm long and 13 mm wide and can be 8 cm long under favorable conditions. Glumes are yellowish-white, glabrous, short and midwide. The sholder is oblique or rounded. Beak is obtuse, narrow, and 1 mm long. The keel is well defined. The coleoptile is white and seedling anthocyanin is absent. Juvenile growth is erect. Plant color at booting is blue green. Waxy bloom is absent. Leaf blades and sheath are not hairy. The auricles are not hairy and have no anthocyanin. The stem is hollow. Usually four stem nodes originate from the node above ground.

Eureka is tall with an average height of 81.5 cm. The stems are strong and resist lodging better than Chris. Date of heading is approximately equal to Chris.

Eureka is resistant to the prevalent races of stem rust (Puccinia graminis f. sp. tritici Erikss and Henn.). It has the following seedling reactions to races of stem rust.

Race	Infection Type
TMNK	2
QSHS	2=
RKQS	;
RTQQ	2
RHRS	;
HJCS	;1
HNLQ	2-

Field reading on adult reaction to stem rust ranged from 0 to tMS. Eureka is also resistant to leaf rust (P. recondita Rob. ex Desm.). Adult plant reactions range from 0 to tMS.

Eureka most closely resembles a group of awnletted hard red spring wheat varieties, namely Waldron, Ellar, Chris, Marquis, Tioga, and Fortuna. Table 2 gives an objective description of differences in the varieties listed above. Eureka differs from Tioga and Fortuna in that the former has a hollow stem and the latter two varieties have solid stems. Eureka primarily differs from Waldron in mature stem color (see enclosed stem samples) and reaction to stem rust races HJCS, RKQS, and RHRS. Eureka differs from Ellar in mature stem color (see enclosed stem samples). Eureka and Ellar have not been compared directly in reaction to stem rust races. The major differences between Eureka and Chris include seed size (see enclosed seed samples), grain weight and reaction to stem rust races TNMK, HNLQ, and RKQS. Eureka also has a darker leaf color at heading than Chris (see enclosed photographs). All older varieties similar in morphology to Eureka are known to be susceptible to stem rust race TNM (15B-2). Eureka possesses a "2" type resistant reaction to this race. All other known hard red spring wheat varieties differ greatly from Eureka in gross morphology (awn-type, plant height, head shape) and/or maturity.

DEPARTMENT OF PLANT SCIENCE
Field Crops-Plant Pathology-Soils
Main Office 219 Agricultural Hall (605) 688-5121
Plant Science Building (605) 688-5156

South Dakota State University
Brookings S.D. 57006

September 20, 1978

Larry W. Dosier, Examiner
Plant Variety Protection Office
USDA, Agric. Marketing Service
National Agric. Library Building
Beltsville, Maryland 20705

Dear Mr. Dosier:

SUBJECT: Application No. 7800105, Wheat, Eureka, Exhibit A, Item 4

Eureka is stable with regard to its varietal characteristics. This is evidenced by observation of those traits over the generations in which Eureka has been grown for evaluation.

If I can be of further assistance, please let me know.

Sincerely,

Don L. Keim
Assistant Professor

DLK:ksg

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Table 1. History of 'Eureka' Hard Red Spring Wheat.
Pedigree: ERA/3/CORRE CAMINO//CIANO 67/SONORA 64
Cross Number: CM 10656
Selection Number: SD 2185

Generation	Year	Location	Planted	Harvested	Nursery Row No.
F_0-F_1	1970-71	Mexico	Cross Made, F_1 Row	Bulked	CM 10656
F_2	1971-72	Mexico	Bulk Row	Head Seln.	CM 10656
F_3	1972	Brookings	Head Row	Head Seln.	2115 8049-8054
F_4	1972-73	Greenhouse	Head Hill	Head Seln.	2912 39-40
F_5	1973	Brookings	Head Row	Head Seln.	3119 4013
F_6	1973-74	Mexico	Head Row	Bulked	SDSU 386
F_7	1974	Moody Co., Redfield	Yield Trial	Bulked	
F_8	1975	9 Locations, South Dakota	Yield Trial	Bulked	
F_9	1975-76	Yuma, Ariz.	Breeder Seed Increase	Bulked	
F_{10}	1976	Moody Co.	Breeder Seed Increase	Bulked	
F_{11}	1977	Brookings	Foundation Seed Inc.	Bulked	

Table 2. Objective description of varietal differences.

Variety	Stem	Mature Stem Color	Headed[1/]	Ripe[1/]	Plant Height[1/]	Seedling Stem Rust Reaction[2/]							Grain Weight[3/]
						Races							
						TNMK	QSHS	HJCS	HNLQ	RKQS	RTQQ	RHRS	
			days	days	cm								mg
Eureka	Hollow	White	62	85	81.5	2	2=	;1	2-	;	2	;	39.4
Waldron	Hollow	Purple	61	86	79.6	2-	2-	2,0	2,0	2,;	2=	;,2	35.2
Ellar	Hollow	Purple	--	--	--	--	--	--	--	--	--	--	38.7
Chris	Hollow	White	63	90	82.8	S	23	0	0	23	23	;	25.5
Marquis	Hollow	White	64	89	87.3	S	2	S	S	S	S	S	--
Tioga	Solid	--	--	--	--	--	--	--	--	--	--	--	38.1
Fortuna	Solid	White	--	--	--	--	--	--	--	--	--	--	42.0

[1/] Data from 1977 Uniform Regional Hard Red Spring Wheat Performance Nursery. Headed: Days from planting, 16-location average. Ripe: Day from planting, 2-location average. Plant Height: 17-location average.

[2/] Data from ARS-USDA Cereal Rust Laboratory, St. Paul, MN.

[3/] Data from 1977 South Dakota Standard Variety Spring Wheat Trials, Watertown.

FORM APPROVED. OMB NO. 40-R3712

FORM GR-470-6
(2-15-73)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY

WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
South Dakota Agricultural Experiment Station, South Dakota State University

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Brookings, SD 57007

FOR OFFICIAL USE ONLY

PVPO NUMBER
7800105

VARIETY NAME OR TEMPORARY DESIGNATION
EUREKA

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

[1] 1 = SPRING 2 = WINTER 3 = OTHER *(Specify)* _____

[2] 1 = SOFT 2 = HARD 3 = OTHER *(Specify)* _____

[2] 1 = WHITE 2 = RED 3 = OTHER *(Specify)* _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

[0][6][4] FIRST FLOWERING

[0][7][0] LAST FLOWERING

4. MATURITY *(50% Flowering)*:

[0][1] NO. OF DAYS *EARLIER* THAN .....

NO. OF DAYS *LATER* THAN .....

[3] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT *(From soil level to top of head)*:

[8][2] CM. HIGH

CM. TALLER THAN .....

[0][1] CM. SHORTER THAN .....

[3] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING *(See reverse)*:

[3] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[0][4] NO. OF NODES *(Originating from node above ground)*

[1] Waxy bloom: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[2][3] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[2] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER *(Specify)*: _____

[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

[1][0] MM. LEAF WIDTH *(First leaf below flag leaf)*

[1] Flag leaf: 1 = NOT TWISTED 2 = TWISTED

[1] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

[3][4] CM. LEAF LENGTH *(First leaf below flag leaf)*:

FORM GR-470-6 (REVERSE)

11. HEAD:

[2] Density: 1 = LAX 2 = DENSE

[1] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER *(Specify)* ______

[3] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[1] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER *(Specify)*: ______

[0][7] CM. LENGTH

[1][3] MM. WIDTH

12. GLUMES AT MATURITY:

[1] Length: 1 = SHORT *(CA. 7 mm.)* 2 = MEDIUM *(CA. 8 mm.)* 3 = LONG *(CA. 9 mm.)*

[2] Width: 1 = NARROW *(CA. 3 mm.)* 2 = MEDIUM *(CA. 3.5 mm.)* 3 = WIDE *(CA. 4 mm.)*

[3] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[1] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[3] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[1] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[2] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[ ] Phenol reaction *(See instructions)*: 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER *(Specify)* ______

[0][6] MM. LENGTH [0][3] MM. WIDTH [3][9] GM. PER 1000 SEEDS

17. SEED CREASE:

[2] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[2] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[2] STEM RUST *(Races)* TNM, RHRS, QSH, HJCS, HNLQ, RKQS

[2] LEAF RUST *(Races)* not identified

[0] STRIPE RUST *(Races)* ______

[0] LOOSE SMUT

[0] POWDERY MILDEW

[0] BUNT

[1] OTHER *(Specify)* Wheat Streak Mosaic

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY [0] APHID *(Bydv.)* [0] GREEN BUG [0] CEREAL LEAF BEETLE

[ ] OTHER *(Specify)* ______

HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Waldron	Seed size	Waldron
Leaf size	Waldron	Seed shape	Waldron
Leaf color	Unknown	Coleoptile elongation	Waldron
Leaf carriage	Waldron	Seedling pigmentation	Waldron

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. *(See attachment.)*

Exhibit D, Additional Description of Variety.

1. Yield and Agronomic Performance (Tables 3, 4, and 5).
2. Yield Response to Environments (Figures 1 and 2).
3. Adult Plant Reaction to Stem Rust and Leaf Rust (Tables 6 and 7).
4. Milling and Baking Quality (Tables 8 and 9).

Table 3. 1977 Uniform Regional Hard Red Spring Wheat Nursery.

	Yield (17)[1]	Test Weight (18)	Height (17)	Headed (16)	Ripe (2)	Lodging[2] (10)	Disease[3] (5)
	bu/a	lbs/bu	cm	days	days	(1-9)	(1-9)
Era	51.6	59.8	67.5	65	91	1.7	2
Angus	45.8	60.4	68.9	63	92	2.0	2
Eureka	44.9	59.1	81.5	62	85	2.3	4
Waldron	43.6	58.5	79.6	61	86	1.9	4
Coteau	43.5	59.4	80.4	64	91	2.7	1
Chris	42.2	59.0	82.8	63	90	4.2	3
Marquis	35.7	58.5	87.3	64	89	3.8	4

[1] Number of stations included.
[2] 1 erect; 9 lodged.
[3] Leaf spotting disease - visual rating 1, no infection; 9, severe infection.

Table 4. South Dakota Standard Variety Spring Wheat Yield Nursery, 1975-1977.

	Yield					Test Weight
	1975[1]	1976	1977	Average	% Waldron	
	bu/A					lbs/bu
Era	21.5	22.9	32.0	25.4	102	57
Eureka	24.8	21.7	28.7	25.0	100	56
Waldron	25.2	21.6	28.1	25.0	--	56
Ellar	23.3	20.9	38.2	24.2	97	57
WS 1809	23.4	22.0	24.2	23.4	94	57
Chris	18.8	18.7	24.1	20.5	82	57

[1] Average of eight locations within each year.

Table 6. Adult stem rust reactions of entries in the 1977 Uniform Regional Hard Red Spring Wheat Nursery. (ARS-USDA, North Dakota, Miller - Statler)

Entry	Percent Severity and Reaction[1/]				Av.[2/] C.I.
	Langdon	Oakes	Minot	Fargo	
Marquis	10MS-tS	15MS-5S	0-tMS	25S-25MS	11.3
Chris	0,5MS	0	0,tS	0-tS	0.0
Waldron	tR-0	0	0	0,5MR,40S	0.1
Coteau	0	0	0	10MR-tMS,40S	1.0
Eureka	tR	tR	0	5R,5R-tMS	0.5
Angus	0	0	0	t-5MS	0.5
Era	0	0	0	5MR-10MS-5S	0.5

Seeded - Langdon--May 12, Oakes--May 3 (overhead irrigation), Minot--May 4, Fargo--May 12. Carrington nursery destroyed by hail on June 26.

[1/] Comma - Separation of plants into 2 or more reaction classes (segregation or seed mixture).

Dash - Range in reaction on each plant or range in severity between plants with same reactions.

Natural inoculum - Additional inoculations of races 15B and 151 at Fargo. Readings at soft dough to mid dough stages.

Fargo - High average maximum daily temperature (27.2°C) during plant and rust development may have influenced the higher reactions of some wheats to race 151 (QSH).

[2/] Av. C.I. - Average coefficient of infection is the average of the 4 coefficients of infection for each entry. Coefficient of infection for each reading was determined by multiplying percent severity by reaction where resistant (R) = 0.2, moderately resistant (MR) = 0.4, intermediate (M) = 0.6, moderately susceptible (MS) = 0.8 and susceptible (S) = 1.0. When a double reading occurred, only the percent severity and the response preceding the comma or dash was used to determine the coefficient. Trace severity (t) = 2.5 percent.

Table 7. Adult leaf rust reactions of entries in the 1977 Uniform Regional Hard Red Spring Wheat Nursery (ARS-USDA, NDSU, Miller-Statler)

Entry	Percent Severity and Reaction[1]				Av.[2] C.I.
	Fargo	Langdon	Minot	Oakes	
Marquis	40S-tMS	50S-10MR	20MS-5MR	40S	34.5
Chris	10R-5MS	5R-tMS	5MR-tMS	5R-tMS	1.5
Waldron	10MS-10MR,30MS	10MS-5MR	5MR-5R	5R-tMS	5.2
Coteau	5MR-tMS	tR	5R-tMS	5R-tMS	1.0
Eureka	10R-tMS	5MR-tMS	tR	5R-tMS	1.3
Angus	5R-tMS	t-5R	tR	tR	.5
Era	5R-5MS	tR	5R-tMS	5R-1MS	1.9

[1] Comma - Separation of plants into two or more reaction classes (segregation or seed mixture)

Dash - Range in reaction on each plant. Range in severity between plants but same reaction class.

Natural Inoculum - Readings were made on flag and flag minus 1 at milk to mid dough stage.

[2] C.I. - Average Coefficient of Infection. Percent severity multiplied by the following values for reaction types R = 0.2, MR = 0.4, MS = 0.8, S = 1.0, t = 0.5.

Table 8. Quality summary of Eureka and check varieties, 1974-1977.

Variety	Total Protein %	Flour Protein %	Flour Extraction %	Mineral @65% Ex. %	Absorption %	Mixogram[1]	Mix Time Min.	Dough Char.[2]	Loaf Volume cc.	Bake Evaluation[3]	General Evaluation[4]
1974 - Redfield Samples											
Eureka	15.7	14.0	64.9	0.40*	63.1	5	4.8	3	940	2	3
Waldron	15.3	14.3	67.3	0.38	63.5	5	4.0	3	890	2	4
1975 - Redfield Samples											
Eureka	18.0	17.1	60.0**	0.51	66.8	3	2.5	3	990	2	3
Waldron	17.6	17.1	64.1	0.61	66.5	4	3.2	3	960	2	4
1976 - Moody County Samples - Foundation Seed											
Eureka	17.1	16.5	67.9	0.39*	70.2	7	4.2	3*	985	4	2
Ellar	16.1	15.2	68.1	0.36	71.7	7	3.8	3	945	2	4
1977 - Standard Variety Trials - East River Bulk - 4 Locations											
Eureka	15.6	14.1	65.8	0.48	64.2	7	5.0	4	190	2	4
Chris	16.6	16.4	66.8	0.41	64.2	4	3.3	5	197	2	4
Waldron	16.1	15.6	66.8	0.41	64.4	5	4.5	4	188	2	4
Ellar	16.6	15.9	65.7	0.53	67.3	5	4.2	5	197	2	3
1977 - Standard Variety Trials - West River Bulk - 4 Locations											
Eureka	16.7	16.1	61.5	0.50	66.0	6	4.8	3	205	2	4
Chris	16.7	16.4	62.9	0.48	66.6	4	3.5	3	203	2	4
Waldron	16.7	16.0	62.5	0.51	66.6	5	4.2	3	203	2	4
Ellar	17.3	15.9	62.3	0.49	64.7*	5	4.5	3	206	4	3
1977 - Breeder's Yield Trial - Average of 4 Locations											
Eureka	16.1	15.4	63.6	0.42	62.8	6	5.1	4	202	5	2
Waldron	15.8	15.1	64.6	0.53	63.9	5	4.1	4	201	3	4
Ellar	15.8	15.0	63.0	0.53	62.0	4	3.6	4	192	5	2

*Minor Deficiency
**Major Deficiency
[1] See Reference Mixograms, Hard Red Spring Wheat Quality Report, 1974-1976 Crops. Hard Red Spring and Durum Quality Laboratory, Fargo, ND
[2] 2 = very elastic; 5 = pliable, elastic
[3] 2 = satisfactory; 8 = unsatisfactory
[4] 1 = no promise; 4 = good promise

Table 9. Results from 1977 Crop Quality Council Tests. 7800105 South Dakota 2185

SUMMARY RESULTS OF COOPERATING LABORATORIES Waldron - Check

Location		Casselton, N.D.		Minot, N.D.					
Variety		Check	SD2185	Check	SD2185				
1	Wheat Protein %	15.9	15.5	15.5	15.5				
2	Flour Protein %	15.0	14.9	14.7	15.1				
3	Test Weight	58.7	58.8	59.5	59.3				
4	1000 Kernel Weight (Grams)	35.7	36.5	35.3	34.8				
5	% Large Kernels	63	70	65	60				
6	% Small Kernels	1	1	1	1				
7	Wheat Ash %	1.82	1.77	1.59	1.48*				
8	Flour Extraction %	69.7	70.0	73.4	71.1*				
9	Flour Ash %	.455	.434*	.396	.393				
10	Pounds 0.46% Ash Flour per cwt. wheat	70.1	73.5*	77.3	77.3				
11	Farinograph: Absorption %	66.2	64.7	64.9	63.7				
	Arrival Time	4.0	3.5	3.8	2.8				
	Peak	8.3	8.5	8.0	8.0				
	Stability	13.5	12.8	12.7	23.9*				
	M.T.I.	30	20	20	10				
12	Bake Absorption (14% M.B.)	65.8	65.6	65.4	64.9*				
13	Loaf Volume (% of Check)	100.0	101.5	100.0	101.0				
14	Mixing Requirement								
	Very Long / Long / Medium / Short / Very Short								
15	Dough Characteristics								
	Bucky-Tough / Strong-Elastic / Medium-Pliable / Mellow-Very Pliable / Weak-Short or Sticky								
16	Mixing Tolerance								
	Much More Tolerance Than Check / More Tolerance Than Check / Tolerance Equivalent To Check / Less Tolerance Than Check / Much Less Tolerance Than Check								
17	Internal Crumb Color								
	Much Brighter Than Check / Brighter Than Check / Equivalent To Check / Poorer Than Check / Much Poorer Than Check								
	Reason for ranking below check†								
18	Internal Grain and Texture								
	Much Better Than Check / Better Than Check / Equivalent To Check / Poorer Than Check / Much Poorer Than Check								
	Reason for ranking below check†			Open					
19	Comparison based on laboratories' considerations of all categories (1-18)								
	Much Better Than Check / Better Than Check / Equivalent To Check / Poorer Than Check / Much Poorer Than Check								

* Difference is statistically significant at the 5% level.
†Most frequently reported comment.